Carestream Molecular Imaging Software Overview

The Carestream MI Software package is more comprehensive and user friendly than ever before. Application specific tool palettes provide access to specific tool sets for manipulation and analysis of images of gels, blots, arrays, plate assays, small animals and more.

- **Image** – tools for control of image appearance, including rotation, cropping and flipping; histogram display and control; software filters and pseudocolors; Image math
- **Lanes** – tools for lane and band analysis, including auto-lane and auto band finding, standards, intensity profile, mass curves
- **Manual-ROIs** – tools for drawing regions of interest and generation of intensity, geometric and positional data
- **Auto-ROIs** – tools for automatic identification of interest and generation of intensity, geometric and positional data
- **Grid-ROIs** – tools for defining and analyzing ROIs in a grid format such as a microplate, slot blot, or array
- **Annotation** – tools for labeling an image with text, graphics, data and other features to enhance communication of results
- **Database** – tools for setting search criteria to find projects based on key words or other file information
**Image Panel**
The Image Panel provides tools to control the appearance of images on screen and in print.

The **Image Display** window provides access to the image histogram, and complete control over histogram and image appearance, including brightness/contrast/gamma, image min/max, pseudocolor, software filters, image overlays, etc.

Free **Rotate and Flip** functions allow proper image orientation

**Signal Orientation** defines features of interest as white or black for analysis algorithms

**Image Math** allow mathematical calculations to be performed on one or a pair of images.

Options include Tasks, Formulas, or Image Processing

**Image Correction** applies a lens or illumination correction to an Image Station 1000, 2000, or 4000 series image

**Info/History** opens a window that stores project information such as capture conditions, key words, and “destructive” changes to an image (i.e. cropping)

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**Lanes Panel**
The Lanes Panel provides tools for the analysis of lanes and bands in electrophoresis gels or blots.
Auto-lane finding and Auto-band finding makes analysis of electrophoresis gels fast and easy. An Intensity Profile is generated for each lane, and mobility and intensity data is generated for bands within each lane. If an appropriate Standard is defined, mass and molecular weight values of unknown bands may be calculated as well. Analysis data, including mobility, molecular weight, mass, intensity, band area, background and gaussian model can be selectively displayed in spreadsheet format.

Multiple lane sets may be defined, allowing rapid analysis of high capacity gel formats.

Manual ROIs Panel
The Manual ROIs panel allows for manual definition and subsequent measurement for one or more regions of interest (ROIs) on an image.

A variety of Tools are provided to manually draw ROIs, including multiple ROI sets on one image.
Two or more ROIs can be set as **Standards**, from which **Mass Curves** are generated and used to produce mass data for other ROIs within a set.

Multiple user selectable **Background** definitions are available for improved accuracy of intensity data. **ROI Templates** can be created allowing the same ROI definitions and standards to be used across a series of images.

**Once defined**, MI software produces intensity, geometry, and positional data for each ROI. In addition, a set of ROIs can be counted or compared quickly and easily. Quantitative data can be selectively displayed in spreadsheet format or exported for further analysis.

**Auto-ROIs Panel**
The Auto-ROIs panel provides four different methods of automatic region of interest (ROI) definition and subsequent analysis defined ROIs on an image.

**Edge Detection** identifies features by searching for gradient edges.
Threshold uses a user defined signal threshold value to identify features from the background.

Density Slice segregates the image into three discrete density ranges, and identifies features that are in the middle density range.

The Peak Finder creates oval or rectangular ROIs around peaks of intensity, and is particularly useful for identification and counting of overlapping ROIs (such as bacterial colonies).

Once defined, MI software produces intensity, geometry, and positional data for each ROI. In addition, a set of ROIs can be counted or compared quickly and easily. Quantitative data can be selectively displayed in spreadsheet format or exported for further analysis.
Grid-ROIs Panel
The Grid-ROIs panel allows definition of a grid for analysis of slot blots, microplates, arrays or other assays that have ROIs in regularly spaced columns or rows.

Once defined, analysis data, including intensity, background, geometry, positional values for each ROI can be selectively displayed. Multiple ROIs can be set as mass standards, from which a mass curve is generated and mass values for experimental ROIs are derived. ROI templates can be created and saved to streamline analysis of a series of similar images. ROI data can be exported as a tab-delimited text file for further analysis and manipulation in other software packages.

Annotations Panel
The Annotations panel provides a copy of the image on an annotations palette and provides tools for adding figure legends, call outs, labels and other text and graphics to prepare the image for communication or publication.
A variety of elements from an image project can be added to the annotations palette, including:

- **Image**, which can be cropped and zoomed in to show specific features of interest
- **Analysis Data** which can be dragged & dropped or copied from the analysis window
- **Intensity Profile** if an image has been analyzed using the Lanes set of tools
- **Mass Curve** if mass standards have been assigned
- **Intensity Scale** which provides a visual index of intensities as defined in the Image Display window

**Database Panel**

Carestream MI software includes an **Image Database** feature that uses data stored in a project’s File Information to employ an advanced search strategy to locate and open a specific project file.
In addition, a **Gel Comparison** feature compares the presence or absence of bands across multiple images stored in the database, and displays the results of this analysis in sorted order.

A **Differential Display** feature uses one lane as a reference and compares this lane to all other lanes in the same image. Lanes are compared on a band by band basis to determine if net intensities or mass are increasing or decreasing.